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ARCHITECTURE OVERVIEW

FIG. 1

1) REQUEST XML FILE IS PASSED TO AGENT MGMT CONTAINING COMPLEX TYPES AGENT MGMT SPLITS THE DATA INTO PARTS AND HANDS THE <METHOD> OVER TO THE CORRESPONDING CUSTOM ACTION DEVICES
2) THE COMPLEX TYPE <METHOD> DESCRIBES THE METHOD TO EXECUTE AND ITS PARAMETERS
3) CUSTOM ACTIONS DEVICES EXECUTE THE FUNCTIONS IN A CERTAIN AREA THEY ARE RESPONSIBLE FOR AND PACK THE RESULT INTO XML COMPLEX TYPES
4) COMPLEX TYPES CONTAINING RESULT DATA ARE RETURNED TO AGENT MGMT
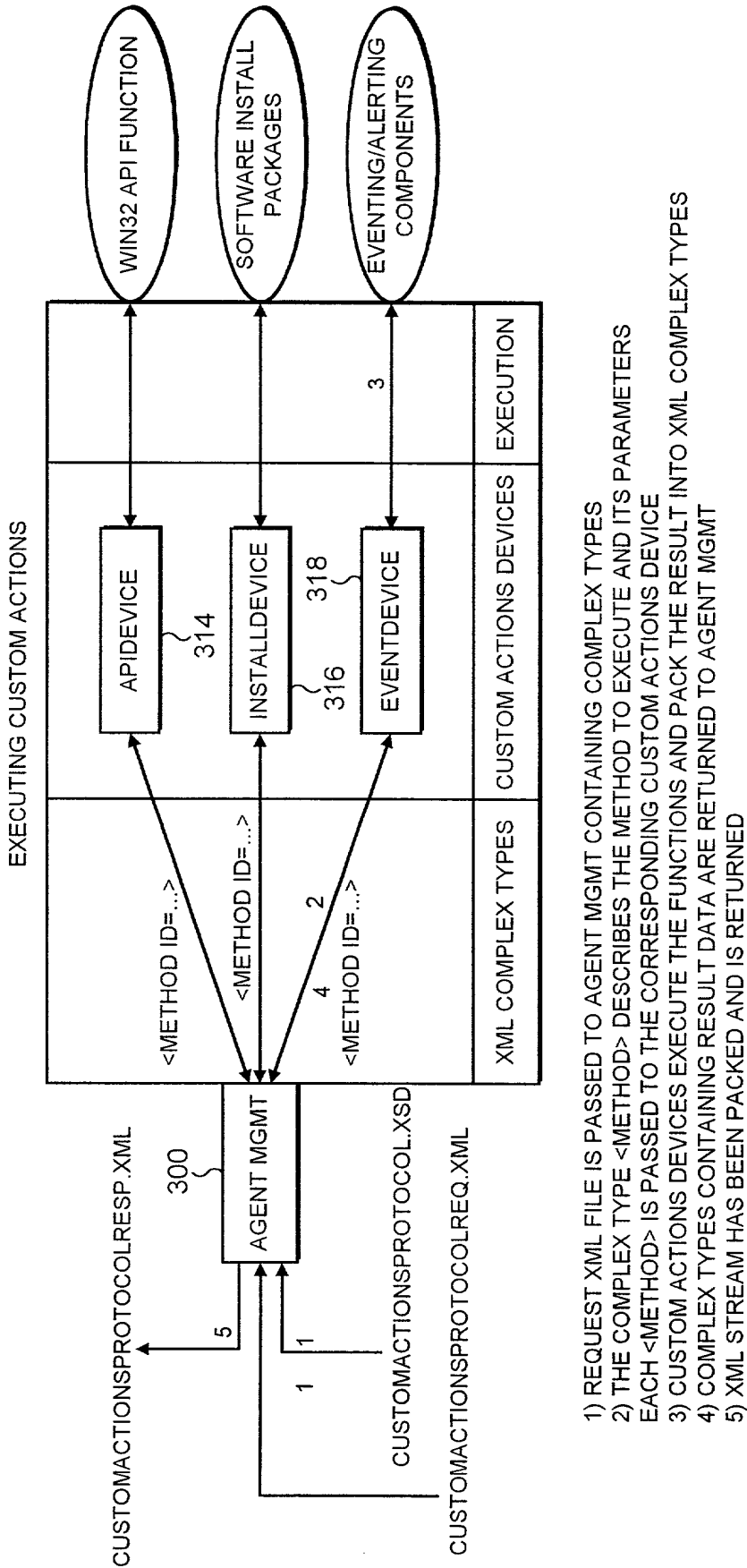5) XML STREAM HAS BEEN PACKED AND IS RETURNED

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WIN32 API FUNCTION

SOFTWARE INSTALL PACKAGES

EVENTING/ALERTING COMPONENTS

EXECUTING CUSTOM ACTIONS

3

EXECUTION

APIDEVICE

314

INSTALLDEVICE

318

316

EVENTDEVICE

CUSTOM ACTIONS DEVICES

<METHOD ID=...>

<METHOD ID=...>

2

4

<METHOD ID=...>

XML COMPLEX TYPES

CUSTOMACTIONSPROTOCOLRESP.XML

300

AGENT MGMT

5

1

1

CUSTOMACTIONSPROTOCOL.XSD

CUSTOMACTIONSPROTOCOLREQ.XML

1) REQUEST XML FILE IS PASSED TO AGENT MGMT CONTAINING COMPLEX TYPES
2) THE COMPLEX TYPE <METHOD> DESCRIBES THE METHOD TO EXECUTE AND ITS PARAMETERS
   EACH <METHOD> IS PASSED TO THE CORRESPONDING CUSTOM ACTIONS DEVICE
3) CUSTOM ACTIONS DEVICES EXECUTE THE FUNCTIONS AND PACK THE RESULT INTO XML COMPLEX TYPES
4) COMPLEX TYPES CONTAINING RESULT DATA ARE RETURNED TO AGENT MGMT
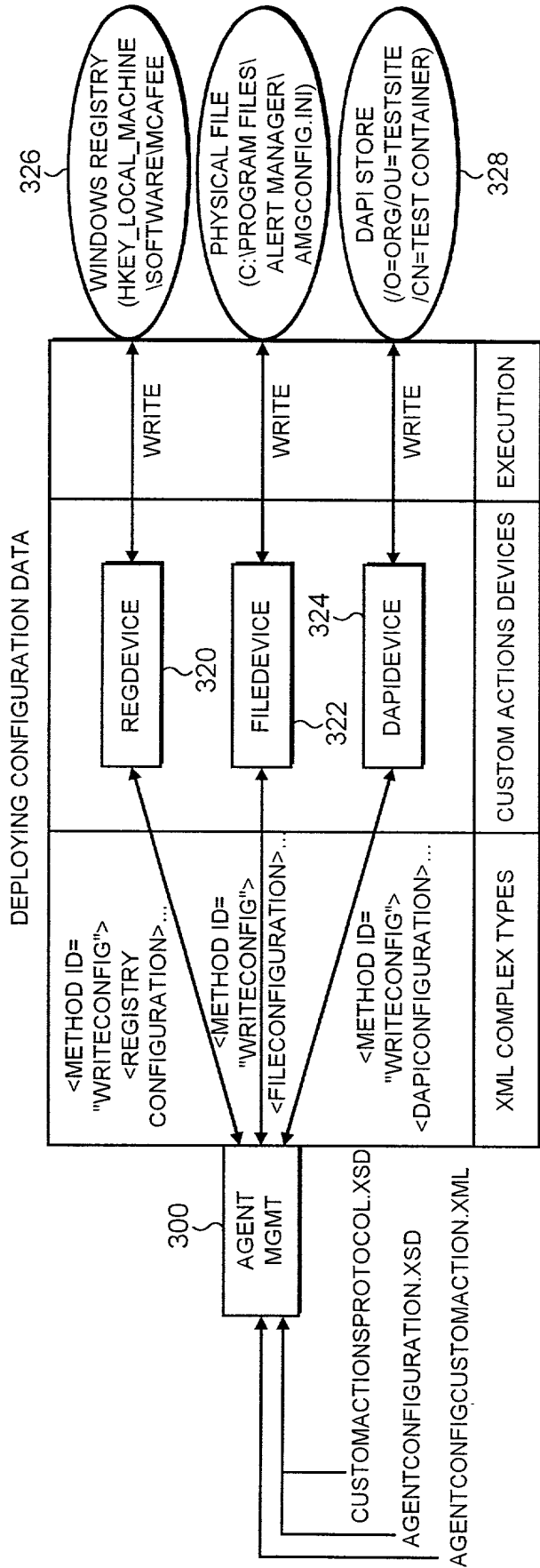5) XML STREAM HAS BEEN PACKED AND IS RETURNED

FIG. 2

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DEPLOYING CONFIGURATION DATA

	CUSTOM ACTIONS DEVICES	EXECUTION

CUSTOMACTIONSPROTOCOL.XSD
AGENTCONFIGURATION.XSD
AGENTCONFIGCUSTOMACTION.XML

300 — AGENT MGMT

`<METHOD ID="WRITECONFIG"> <REGISTRY CONFIGURATION>...` → REGDEVICE 320 → WRITE → WINDOWS REGISTRY (HKEY_LOCAL_MACHINE \SOFTWARE\MCAFEE) 326

`<METHOD ID="WRITECONFIG"> <FILECONFIGURATION>...` → FILEDEVICE 322 → WRITE → PHYSICAL FILE (C:\PROGRAM FILES\ ALERT MANAGER\ AMGCONFIG.INI)

324

`<METHOD ID="WRITECONFIG"> <DAPICONFIGURATION>...` → DAPIDEVICE → WRITE → DAPI STORE (/O=ORG/OU=TESTSITE /CN=TEST CONTAINER) 328

XML COMPLEX TYPES

1) AGENT MGMT RECEIVES AGENTCONFIGCUSTOMACTION.XML
2) .XML FILE IS VALIDATED AGAINST .XSD FILE(S) TO MAKE SURE VALID DATA IS WRITTEN
3) XML COMPLEX TYPES ARE SENT TO CUSTOM ACTIONS DEVICES, THE PARAMETERS CONTAINING THE CONFIGURATION DATA
4) CUSTOM ACTIONS DEVICES UPDATE THE CONFIG STORE THEY ARE RESPONSIBLE FOR
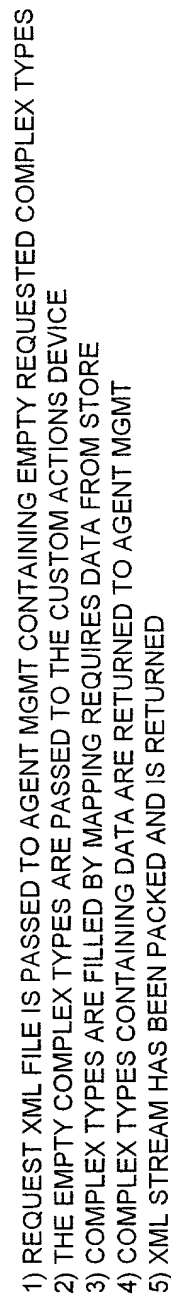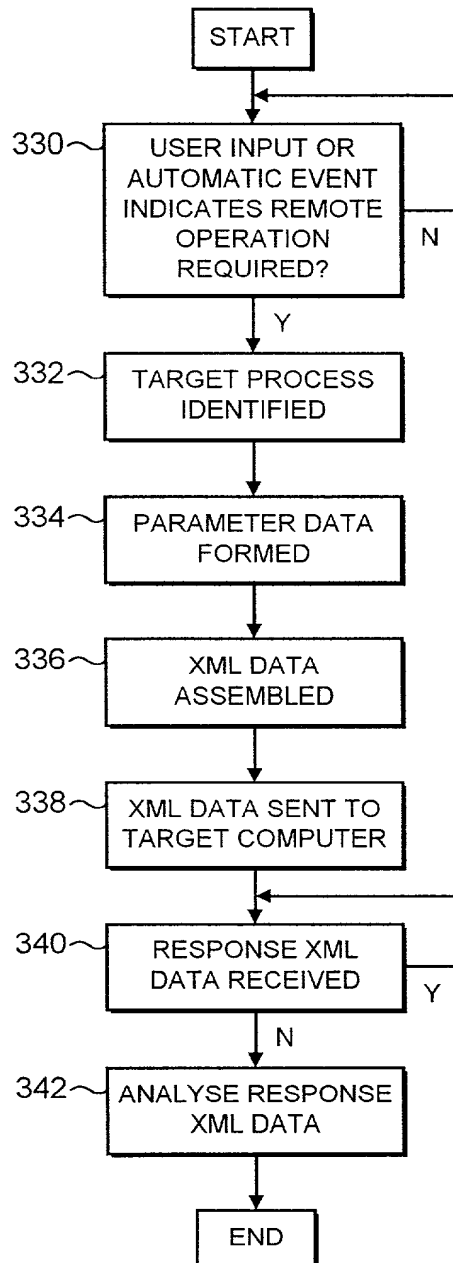5) OPTIONALLY A RETURN VALUE CAN BE RETURNED AS A RESPONSE.XML FILE

FIG. 3

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RETRIEVING CONFIGURATION DATA

WINDOWS REGISTRY
(HKEY_LOCAL_MACHINE
\SOFTWARE\MCAFEE

PHYSICAL FILE
(C:\PROGRAM FILES\
ALERT MANAGER\
AMGCONFIG.INI)

DAPI STORE
(/O=ORG/OU=TESTSITE
/CN=TEST CONTAINER)

READ
READ
READ

REGDEVICE
320

FILEDEVICE
322

DAPIDEVICE
324

MAPPING

CUSTOM ACTIONS DEVICES

<METHOD ID=
"READCONFIG">
<REGISTRY
CONFIGURATION>...

<METHOD ID=
"READCONFIG">
<FILECONFIGURATION>...

<METHOD ID=
"READCONFIG">
<DAPICONFIGURATION>...

2

4

XML COMPLEX TYPES

AGENT
MGMT

5

RESPONSE.XML

1

CUSTOMACTIONSPROTOCOL.XSD
AGENTCONFIGURATION.XSD

1

AGENTCONFIGCUSTOMACTION.XML

1) REQUEST XML FILE IS PASSED TO AGENT MGMT CONTAINING EMPTY REQUESTED COMPLEX TYPES
2) THE EMPTY COMPLEX TYPES ARE PASSED TO THE CUSTOM ACTIONS DEVICE
3) COMPLEX TYPES ARE FILLED BY MAPPING REQUIRES DATA FROM STORE
4) COMPLEX TYPES CONTAINING DATA ARE RETURNED TO AGENT MGMT
5) XML STREAM HAS BEEN PACKED AND IS RETURNED

FIG. 4

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```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                           ▼
              ┌────────────────────────┐
              │    USER INPUT OR       │
    330 ───   │  AUTOMATIC EVENT       │─────┐
              │  INDICATES REMOTE      │     │
              │    OPERATION           │   N │
              │    REQUIRED?           │     │
              └────────────────────────┘◄────┘
                           │
                         Y │
                           ▼
              ┌────────────────────────┐
    332 ───   │   TARGET PROCESS       │
              │    IDENTIFIED          │
              └────────────────────────┘
                           │
                           ▼
              ┌────────────────────────┐
    334 ───   │   PARAMETER DATA       │
              │     FORMED             │
              └────────────────────────┘
                           │
                           ▼
              ┌────────────────────────┐
    336 ───   │    XML DATA            │
              │   ASSEMBLED            │
              └────────────────────────┘
                           │
                           ▼
              ┌────────────────────────┐
    338 ───   │  XML DATA SENT TO      │
              │  TARGET COMPUTER       │
              └────────────────────────┘
                           │
                           ▼
              ┌────────────────────────┐
    340 ───   │   RESPONSE XML         │─────┐
              │   DATA RECEIVED        │   Y │
              └────────────────────────┘◄────┘
                           │
                         N │
                           ▼
              ┌────────────────────────┐
    342 ───   │  ANALYSE RESPONSE      │
              │    XML DATA            │
              └────────────────────────┘
                           │
                           ▼
                    ┌─────────────┐
                    │    END      │
                    └─────────────┘
```

FIG. 5

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START

XML DATA RECEIVED FROM INITIATING COMPUTER? — N — ~344

Y

VALIDATE XML DATA? — ~346

FAIL

PASS

348~ READ TARGET PROCESS IDENTIFIER(S) FROM XML DATA

350~ TRIGGER TARGET PROCESS & PASS ANY ASSOCIATED PARAMETERS FROM XML DATA

352~ RESPONSE RECEIVED FROM TARGET PROCESS? — N

Y

354~ PACK RESPONSE INTO XML DATA

356~ RETURN XML DATA TO INITIATING COMPUTER

END

FIG. 6

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START

358 — AGENT INDICATES TARGET PROCESS START

N

Y

360 — RECEIVE PARAMETER DATA FROM AGENT

362 — PERFORM OPERATION

364 — RETURN PARAMETER DATA TO AGENT

END

FIG. 7

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PROTOCOL SPECIFICATION	
<CONTROLDATA>	CONTAINS AGENT SPECIFIC CONTROL DATA LIKE VERSION INFORMATION, THE COMMAND TO EXECUTE AND COMPUTER INFORMATION SENDING THE CUSTOM ACTIONS INFORMATION
<COMMAND>	THE COMMAND FIELD COULD BE USED TO EASILY DETERMINE IF DATA IS GOING TO BE RETRIEVED (REQUESTCUSTOMACTION) OR RETURNED AFTER THE ACTION HAS BEEN EXECUTED (RESPONDTOCUSTOMACTION) - OPTIONAL
<SERVER>	COMPUTER INFORMATION OF THE SENDER. IF THE AGENT IS ABLE TO PROCESS REQUESTS IN PARALLEL AND ASYNCHRONOSLY, THIS INFORMATION IS USEFUL. THE SIMPLEST FORM OF THIS FIELD CONTAINS THE COMPUTER NAME
<CUSTOMACTIONS>	ANY NUMBER OF CUSTOM ACTION COM SERVERS OR DLLS OR EXECUTEABLES REQUIRED FOR THE TASKS ARE LISTED WITHIN THE CUSTOMACTIONS
ID	THE ID SPECIFIES A CLSID IF THE CUSTOM ACTION METHOD IS CONTAINED IN A COM SERVER OR THE PATH TO A DLL/EXE FILE IF A LIBRARY OR AN EXECUTEABLE IMPLEMENTS THE METHOD TO EXECUTE. IF A CLSID IS SPECIFIED, THE FOLLOWING <INTERFACE> COMPLEX TYPE IS REQUIRED TO SPECIFY THE INTERFACE OF THE COM SERVER CONTAINING THE METHOD TO EXECUTE. OTHERWISE <INTERFACE> IS NOT REQUIRED AND ANY NUMBER OF <METHOD> TYPES FOLLOW IMMEDIATELY
<INTERFACE>	ONLY REQUIRED IF THE <METHOD> IS IMPLEMENTED IN A COM SERVER
ID	THE INTERFACE IDENTIFIER OF THE COM SERVER (IID)
<METHOD>	ANY NUMBER OF METHODS IMPLEMENTED IN THE CUSTOM ACTION DEVICE
ID	THE METHOD NAME. IN CASE OF A COM SERVER, THIS IS THE METHOD NAME OF THE COM INTERFACE, ELSE THIS DENOTES THE NAME OF AN EXPORTED FUNCTION OR E.G. A COMMAND LINE PARAMETER OF AN EXECUTABLE
<PARAMETER>	ANY NUMBER OF PARAMETERS REQUIRED FOR THE METHOD. THIS INCLUDES REQUESTED OUT PARAMETERS, WHICH ARE LISTED, BUT DON'T CONTAIN DATA AND INOUT PARAMETERS WHICH HAVE A DIFFERENT VALUE ON RESPONSE THAN ON REQUEST
ID	THE NAME OF THE PARAMETER
TYPE	CAN BE ANY STANDARD XML DATATYPE
INOUT	POSSIBLE VALUES ARE 'IN' AND 'INOUT'. SPECIFIES IF THE PARAMETER IS REQUESTED, PASSED TO THE FUNCTION OR PASSED TO THE FUNCTION FOR MODIFICATION
<ANY>	ANY OTHER NON STANDARD XML DATATYPE CAN FOLLOW

FIG. 8

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CUSTOM ACTIONS PROTOCOL XSOL

FIG. 9

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```xml
<?xml version="1.0" ?>
- <AgentProtocol xmlns="http://www.nai.com"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.nai.com CustomActionsProtocol.xsd">
  - <ControlData>
      <Version>0x01000001</Version>
      <MinVersion>0x01000001</MinVersion>
      <Command>RequestCustomAction</Command>
      <Server>ned1wnts2ke</Server>
    </ControlData>
  - <CustomActions
      id="<AGENT_INSTALLED_DIR>\\CustomActionsLibrary\\CustAct1.dll">
    - <Method id="GetRegStringValue">
        <Parameter id="Key" type="xs:string"
          inout="in"><AGENT_INSTALLED_REGKEY></Parameter>
        <Parameter id="Valuename" type="xs:string"
          inout="in">AgentVersion</Parameter>
        <Parameter id="Result" type="xs:string" inout="out" />
      </Method>
    </CustomActions>
  - <CustomActions id="{06E0062A-5069-4793-ACED-F80BE1BBC4AF}">
    - <Interface id="{C9E1CC03-8007-412A-8F5D-532C57DF4482}">
      - <Method id="ExecuteSilentInstallation">
          <Parameter id="ProductName" type="xs:string"
            inout="in">TestInstallProduct</Parameter>
          <Parameter id="ProductVersion" type="xs:decimal"
            inout="in">0x01000001</Parameter>
          <Parameter id="Location" type="xs:string"
            inout="in">c:\InstallImages</Parameter>
          <Parameter id="Result" type="xs:string" inout="out" />
        </Method>
      </Interface>
    - <Interface id="{C9E1CC03-8007-412A-8F5D-532C57DF4482}">
      - <Method id="GetSystemDirectory">
          <Parameter id="Directory" type="xs:string" inout="out" />
          <Parameter id="Result" type="xs:decimal" inout="out" />
        </Method>
      </Interface>
    </CustomActions>
  - <CustomActions id="{06E0062B-5069-4793-ACED-F80BE1BBC4AF}">
    - <Interface id="{A000CC03-8007-412A-8F5D-532C57DF4482}">
      - <Method id="TriggerEvent">
          <Parameter id="EventID" type="xs:decimal"
            inout="in">1000</Parameter>
          <Parameter id="EventDescription" type="xs:decimal"
            inout="in">The event %EventID% has been triggered by %
            USERNAME% on computer %COMPUTERNAME%. The %
            FILENAME% file is infected with %VIRUSNAME%. This has
            been detected by engineversion %ENGINEVERSION%
            datversion %DATVERSION%.</Parameter>
          <Parameter id="COMPUTERNAME" type="xs:string"
            inout="in">sourcecomputer</Parameter>
          <Parameter id="USERNAME" type="xs:string"
            inout="in">sourceuser</Parameter>
          <Parameter id="FILENAME" type="xs:string"
            inout="in">kernel32.dll</Parameter>
          <Parameter id="VIRUSNAME" type="xs:string"
```

CUSTOM ACTIONS PROTOCOL RESP XML

FIG. 10A

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```
inout="in">Nimbda</Parameter>
  <Parameter id="ENGINEVERSION" type="xs:decimal"
    inout="in">0x04005001</Parameter>
  <Parameter id="DATVERSION" type="xs:decimal"
    inout="in">0x07003009</Parameter>
  <Parameter id="Result" type="xs:string" inout="out" />
</Method>
</Interface>
</CustomActions>
</AgentProtocol>
```

CUSTOM ACTIONS PROTOCOL REQ XML

FIG. 10B

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```
<?xml version="1.0" ?>
- <AgentProtocol xmlns="http://www.nai.com"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.nai.com CustomActionsProtocol.xsd">
  - <ControlData>
      <Version>0x01000001</Version>
      <MinVersion>0x01000001</MinVersion>
      <Command>RspondToCustomAction</Command>
      <Server>ned1wnts2ke</Server>
    </ControlData>
  - <CustomActions
      id="<AGENT_INSTALLED_DIR>\\CustomActionsLibrary\\CustAct1.dll">
    - <Method id="GetRegStringValue">
        <Parameter id="Result" type="xs:string"
          inout="out">5.0.1.10</Parameter>
      </Method>
    </CustomActions>
  - <CustomActions id="{06E0062A-5069-4793-ACED-F80BE1BBC4AF}">
    - <Interface id="{C9E1CC03-8007-412A-8F5D-532C57DF4482}">
      - <Method id="ExecuteSilentInstallation">
          <Parameter id="Result" type="xs:string" inout="out">Error: Invalid
            Image path specified.</Parameter>
        </Method>
      </Interface>
    - <Interface id="{C9E1CC03-8007-412A-8F5D-532C57DF4482}">
      - <Method id="GetSystemDirectory">
          <Parameter id="Directory" type="xs:string"
            inout="out">C:\Winnt\System32</Parameter>
          <Parameter id="Result" type="xs:decimal"
            inout="out">0</Parameter>
        </Method>
      </Interface>
    </CustomActions>
  - <CustomActions id="{06E0062B-5069-4793-ACED-F80BE1BBC4AF}">
    - <Interface id="{A000CC03-8007-412A-8F5D-532C57DF4482}">
      - <Method id="TriggerEvent">
          <Parameter id="Result" type="xs:string" inout="out">Event sent to
            testcomputer2</Parameter>
        </Method>
      </Interface>
    </CustomActions>
  </AgentProtocol>
```
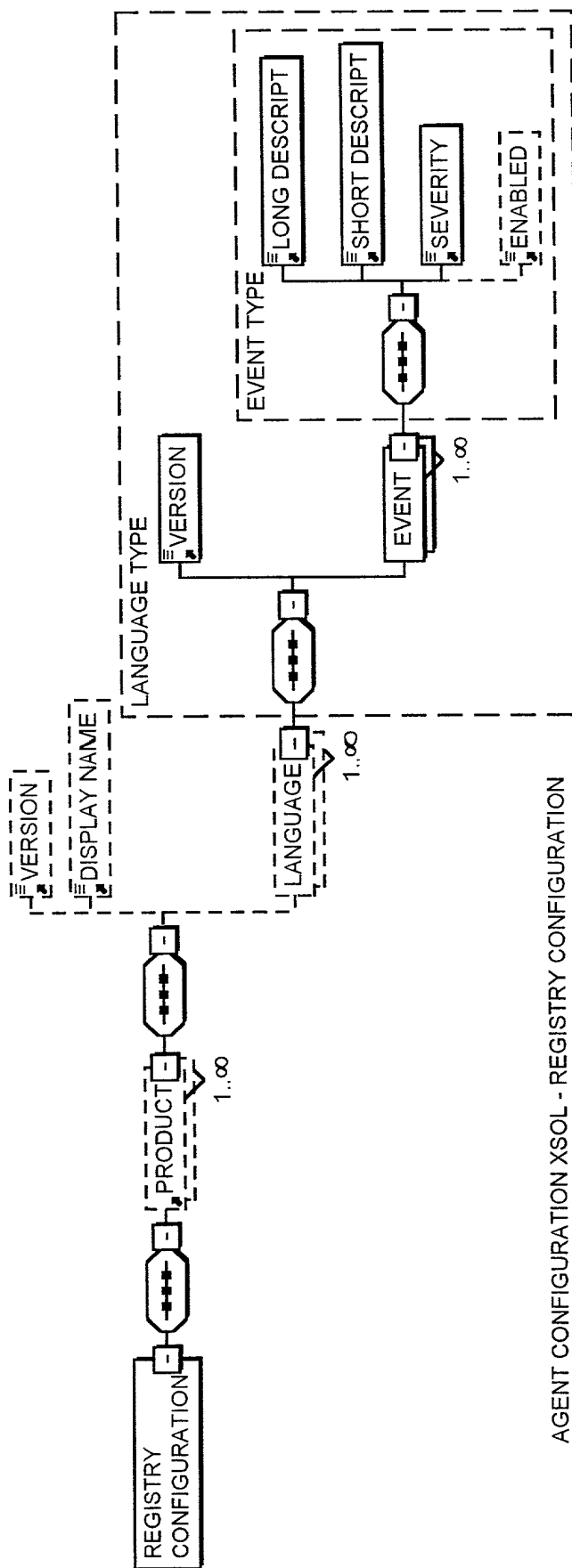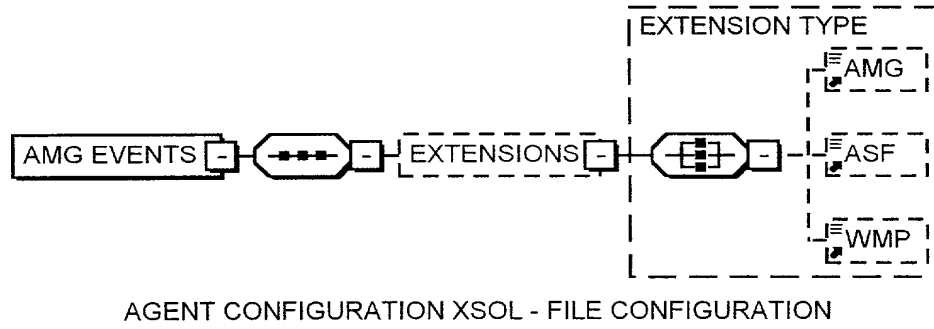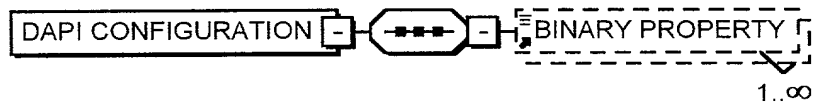
CUSTOM ACTIONS PROTOCOL RESP XML

FIG. 11

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AGENT CONFIGURATION XSOL - REGISTRY CONFIGURATION

FIG. 12

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EXTENSION TYPE

AMG

AMG EVENTS ─ ─●●●─ ─ EXTENSIONS ─ ─ ─ ASF

WMP

AGENT CONFIGURATION XSOL - FILE CONFIGURATION

FIG. 13

DAPI CONFIGURATION ─ ─●●●─ ─ BINARY PROPERTY

1..∞

AGENT CONFIGURATION XSOL - DAPI CONFIGURATION

FIG. 14

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```xml
<?xml version="1.0" ?>
- <AgentProtocol xmlns="http://www.nai.com"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.nai.com CustomActionsProtocol.xsd
    http://www.nai.com AgentConfiguration.xsd">
  - <ControlData>
      <Version>0x01000001</Version>
      <MinVersion>0x01000001</MinVersion>
      <Command>RequestCustomAction</Command>
      <Server>ned1wnts2ke</Server>
    </ControlData>
  - <CustomActions id="RegistryMapping.dll">
    - <Method id="WriteConfig">
      - <RegistryConfiguration
          id="HKEY_LOCAL_MACHINE\SOFTWARE\McAfee">
        - <Product id="Alert Manager">
            <Version>0x04070000</Version>
            <DisplayName>Alert Manager 4.7</DisplayName>
          - <Language id="0407">
              <Version>0x01000002</Version>
            - <Event id="1">
                <LONGDESCRIPT>Das ist eine Test-Nachricht von Alert
                  Manager.</LONGDESCRIPT>
                <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
                <Severity>5</Severity>
                <Enabled>1</Enabled>
              </Event>
            </Language>
          - <Language id="0409">
              <Version>0x01000002</Version>
            - <Event id="1">
                <LONGDESCRIPT>This is an alert manager test
                  messge.</LONGDESCRIPT>
                <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
                <Severity>0</Severity>
                <Enabled>1</Enabled>
              </Event>
            - <Event id="2">
                <LONGDESCRIPT>Text of event 2.</LONGDESCRIPT>
                <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
                <Severity>1</Severity>
              </Event>
            </Language>
          </Product>
        </RegistryConfiguration>
      </Method>
    - <Method id="ReadConfig">
        <RegistryConfiguration
          id="HKEY_LOCAL_MACHINE\SOFTWARE\McAfee\*" />
      </Method>
    </CustomActions>
  - <CustomActions id="INIFileMapping.dll">
    - <Method id="WriteConfig">
      - <FileConfiguration id="C:\Program Files\Alert
          Manager\AMGConfig.ini">
        - <Extensions>
```

AGENT CONFIG CUSTOM ACTION XML

FIG. 15A

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```
        <amg>AMGConfig</amg>
        <asf>MPEGVideo</asf>
        <wmp>MPEGVideo2</wmp>
      </Extensions>
    </FileConfiguration>
  </Method>
- <Method id="ReadConfig">
    <FileConfiguration id="C:\Program Files\Alert
      Manager\AMGConfig.ini" />
  </Method>
</CustomActions>
- <CustomActions id="MAPIMapping.dll">
  - <Method id="WriteConfig">
    - <DAPIConfiguration id="/O=org/OU=TestSite/CN=TestContainer">
        <BinaryProperty>0123456789ABCDEF00000</BinaryProperty>
      </DAPIConfiguration>
    </Method>
  - <Method id="ReadConfig">
      <DAPIConfiguration id="/O=org/OU=TestSite/CN=TestContainer" />
    </Method>
  </CustomActions>
</AgentProtocol>
```
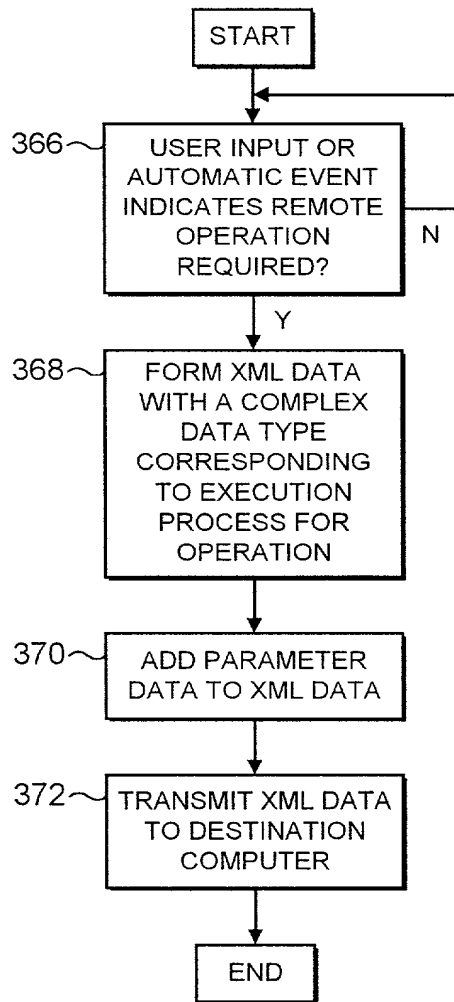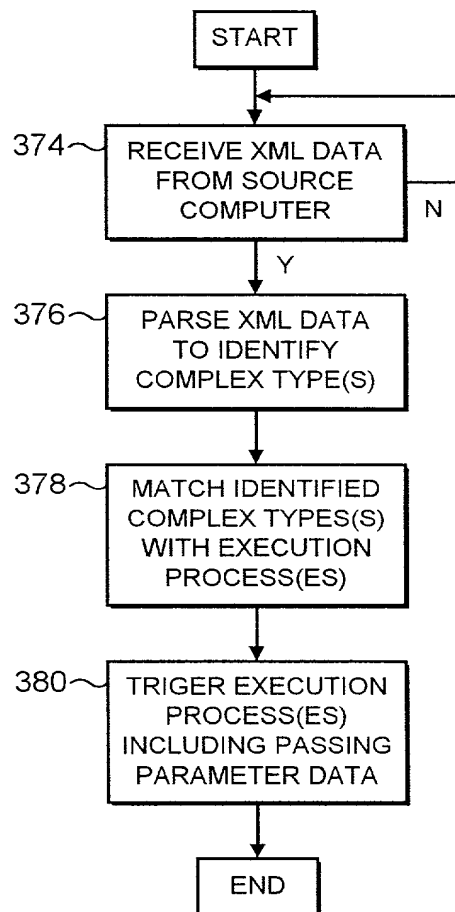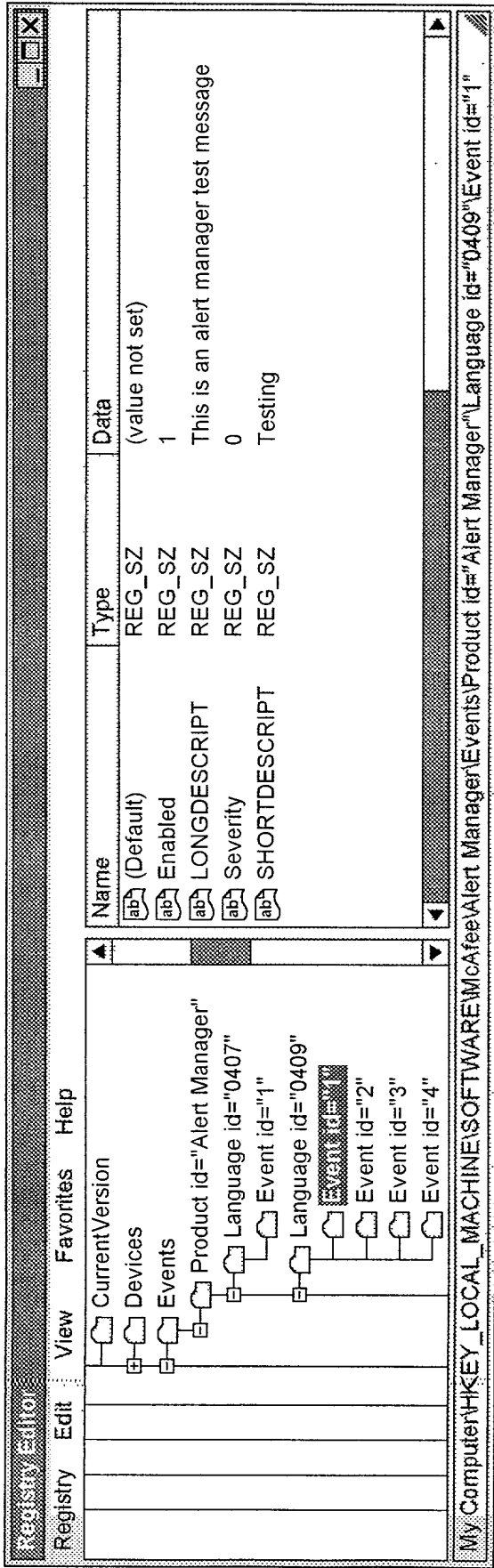
AGENT CONFIG CUSTOM ACTION XML

FIG. 15B

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```
                      ┌──────────┐
                      │  START   │
                      └──────────┘
                           │
                           ▼
         ┌─────────────────────────────────┐
 366 ────│   USER INPUT OR                 │
         │   AUTOMATIC EVENT               │──── N
         │   INDICATES REMOTE              │
         │   OPERATION                     │
         │   REQUIRED?                     │
         └─────────────────────────────────┘
                           │ Y
                           ▼
         ┌─────────────────────────────────┐
 368 ────│   FORM XML DATA                 │
         │   WITH A COMPLEX                │
         │   DATA TYPE                     │
         │   CORRESPONDING                 │
         │   TO EXECUTION                  │
         │   PROCESS FOR                   │
         │   OPERATION                     │
         └─────────────────────────────────┘
                           │
                           ▼
         ┌─────────────────────────────────┐
 370 ────│   ADD PARAMETER                 │
         │   DATA TO XML DATA              │
         └─────────────────────────────────┘
                           │
                           ▼
         ┌─────────────────────────────────┐
 372 ────│   TRANSMIT XML DATA             │
         │   TO DESTINATION                │
         │   COMPUTER                      │
         └─────────────────────────────────┘
                           │
                           ▼
                      ┌──────────┐
                      │   END    │
                      └──────────┘
```

FIG. 16

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START

374 — RECEIVE XML DATA FROM SOURCE COMPUTER

N

Y

376 — PARSE XML DATA TO IDENTIFY COMPLEX TYPE(S)

378 — MATCH IDENTIFIED COMPLEX TYPES(S) WITH EXECUTION PROCESS(ES)

380 — TRIGER EXECUTION PROCESS(ES) INCLUDING PASSING PARAMETER DATA

END

FIG. 17

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Registry Editor

Registry | Edit | View | Favorites | Help

- CurrentVersion
- Devices
- Events
  - Product id="Alert Manager"
    - Language id="0407"
      - Event id="1"
    - Language id="0409"
      - Event id="1"
      - Event id="2"
      - Event id="3"
      - Event id="4"

Name	Type	Data
(Default)	REG_SZ	(value not set)
Enabled	REG_SZ	1
LONGDESCRIPT	REG_SZ	This is an alert manager test message
Severity	REG_SZ	0
SHORTDESCRIPT	REG_SZ	Testing

My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\McAfee\Alert Manager\Events\Product id#"Alert Manager"\Language id#"0409"\Event id#"1"

REGISTRY DATA FIG. 18

Message Editor - Alert Manager Message Configuration

File | Property | Help

- Alert Manager
  - German (Germany)
    - 1: Testing
  - English (United States)
    - 1: Testing
    - 2: Testing
    - 3: Testing
    - 4: Testing

Message Property Name	Message Property Value
Long description	This is an alert manager test message
Short description	Testing
Severity	0
Enabled	1

For Help, press F1

DOM DATA VIEW FIG. 19

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```
<?xml version="1.0" ?>
- <AMGEvents xmlns="http://www.nai.com"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.nai.com AMGEvents.xsd">
  - <Product id="Alert Manager">
      <Version>0x04070000</Version>
      <DisplayName>Alert Manager 4.7</DisplayName>
    - <Language id="0407">
        <Version>0x01000002</Version>
      - <Event id="1">
          <LONGDESCRIPT>Das ist eine Test-Nachricht von Alert
            Manager.</LONGDESCRIPT>
          <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
          <Severity>5</Severity>
          <Enabled>1</Enabled>
        </Event>
      </Language>
    - <Language id="0409">
        <Version>0x01000002</Version>
      - <Event id="1">
          <LONGDESCRIPT>This is an alert manager test
            messge.</LONGDESCRIPT>
          <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
          <Severity>0</Severity>
          <Enabled>1</Enabled>
        </Event>
      - <Event id="2">
          <LONGDESCRIPT>Text of event 2.</LONGDESCRIPT>
          <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
          <Severity>1</Severity>
        </Event>
      - <Event id="3">
          <LONGDESCRIPT>Text of event 3.</LONGDESCRIPT>
          <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
          <Severity>1</Severity>
        </Event>
      - <Event id="4">
          <LONGDESCRIPT>Text of event 4.</LONGDESCRIPT>
          <SHORTDESCRIPT>Testing</SHORTDESCRIPT>
          <Severity>1</Severity>
        </Event>
      </Language>
    </Product>
  </AMGEvents>
```

XML DATA

FIG. 20

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XSD DATA

FIG. 21

GENERATED WITH XMLSPY SCHEMA EDITOR · www.xmlspy.com

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```xml
<?xml version="1.0" encoding="UTF-8" ?>
<!-- edited with XML Spy v4.0.1 U (http://www.xmlspy.com) by Napalm
(Napalm)   -->
- <xs:schema targetNamespace="http://www.nai.com"
    xmlns="http://www.nai.com"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified">
    <xs:element name="DisplayName" type="xs:string" />
    <xs:element name="Enabled" type="xs:boolean" />
  - <xs:complexType name="EventType">
    - <xs:all>
        <xs:element ref="LONGDESCRIPT" />
        <xs:element ref="SHORTDESCRIPT" />
        <xs:element ref="Severity" />
        <xs:element ref="Enabled" minOccurs="0" />
      </xs:all>
      <xs:attribute name="id" type="xs:string" use="required" />
    </xs:complexType>
  - <xs:complexType name="LanguageType">
    - <xs:sequence>
        <xs:element ref="Version" />
        <xs:element name="Event" type="EventType"
          maxOccurs="unbounded" />
      </xs:sequence>
      <xs:attribute name="id" type="xs:string" use="required" />
    </xs:complexType>
  - <xs:element name="Product">
    - <xs:complexType>
      - <xs:sequence>
          <xs:element ref="Version" />
          <xs:element ref="DisplayName" />
          <xs:element name="Language" type="LanguageType"
            maxOccurs="unbounded" />
        </xs:sequence>
        <xs:attribute name="id" type="xs:string" use="required" />
      </xs:complexType>
    </xs:element>
  - <xs:element name="AMGEvents">
    - <xs:complexType>
      - <xs:sequence>
          <xs:element ref="Product" maxOccurs="unbounded" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="LONGDESCRIPT" type="xs:string" />
    <xs:element name="SHORTDESCRIPT" type="xs:string" />
    <xs:element name="Severity" type="xs:string" />
    <xs:element name="Version" type="xs:string" />
</xs:schema>
```
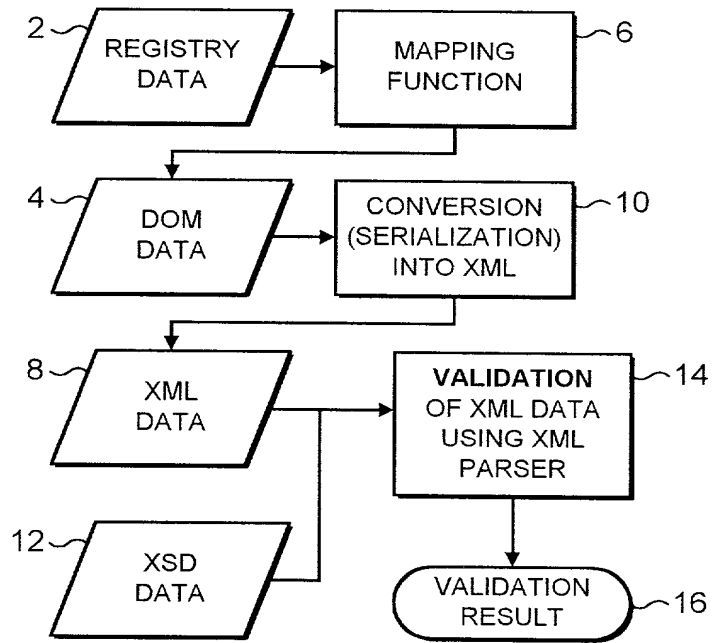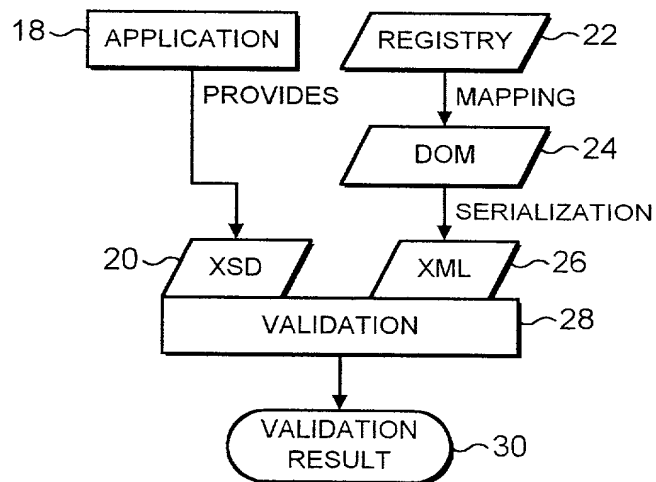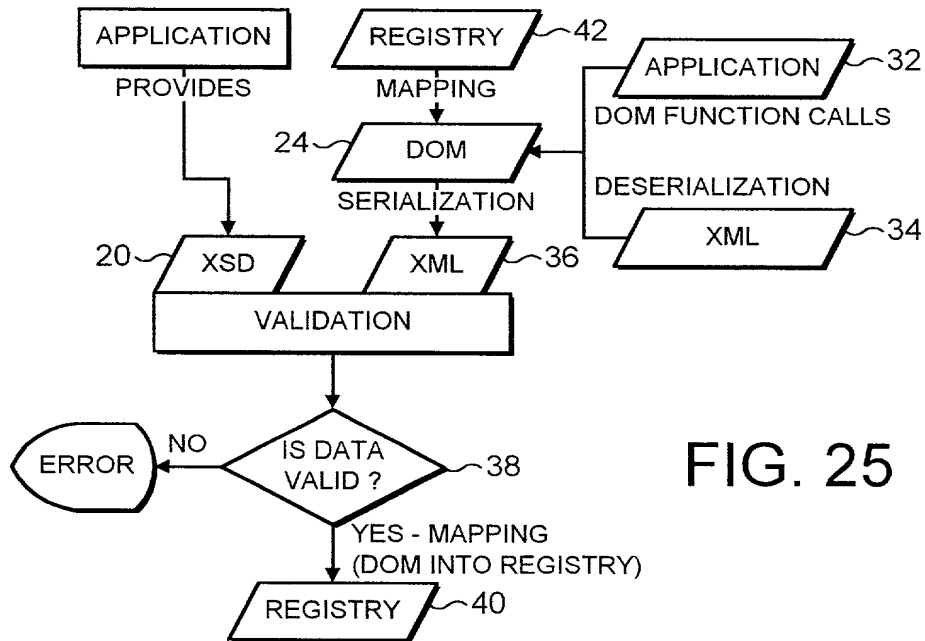
XSD DATA

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FIG. 23

FIG. 24

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APPLICATION

PROVIDES

REGISTRY 42

MAPPING

APPLICATION 32

DOM FUNCTION CALLS

24 DOM

SERIALIZATION

DESERIALIZATION

XML 34

20 XSD

XML 36

VALIDATION

ERROR

NO

IS DATA VALID ? 38

YES - MAPPING
(DOM INTO REGISTRY)

REGISTRY 40

FIG. 25

APPLICATION

PROVIDES

REGISTRY

MAPPING

APPLICATION

DOM FUNCTION CALLS

DOM

SERIALIZATION

DESERIALIZATION

XML

XSD

XML

VALIDATION

ERROR

NO

IS DATA VALID ? 38

YES

TRANSFER XML DATA 44

XML 46

DESERIALIZATION

DOM 48

MAPPING

REGISTRY 50

FIG. 26

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APPLICATION

PROVIDES

REGISTRY

MAPPING

APPLICATION

DOM FUNCTION CALLS

DOM

SERIALIZATION

DESERIALIZATION

XML

XSD

XML

VALIDATION

ERROR ←NO— IS DATA VALID ?

YES

TRANSFER XML DATA   44

APPLICATION   52

PROVIDES

XML

XSD

VALIDATION

ERROR ←NO— IS DATA VALID ?

YES - XML DESERIALIZATION

DOM

MAPPING

REGISTRY

FIG. 27

CPU   202

RAM   204

ROM   206

NIC   208

HDD   210

DISPLAY DRIVER   212

USER I/O   216

214

218

220

200

222

FIG. 28